

CLAIMS

What is claimed is:

1. A process for treating meat comprising:
an animal;
a treatment gas;
Introducing said treatment gas through said animals respiratory and
circulatory systems into said meat;
said treatment gas preserves said meat.
2. A process for treating meat comprising:
a live animal;
treatment fluid;
said live animal inhales said treatment fluid;
said treatment fluid diffuses into the blood of said animal;
said treatment fluid preserves said meat.
3. A process for treating edible meat comprising:
a meat bearing animal;
fluid containing smoke gas is exposed to the respiratory system of said
animal;
an element of said smoke gas diffuses through the respiratory system into
the blood of said animal and flows into said meat;
said smoke gas preserves said edible meat.
4. A process for treating meat comprising:
a live animal;
dissolving a treatment gas into a liquid;
said dissolved treatment gas is introduced to the circulatory system and
circulated throughout said animal;
said treatment dissolved gas preserves said meat for food.
5. A process for treating meat comprising;
solvent;
gas solute;
said gas is dissolved in said solvent forming a solution;

said solution is applied to the circulatory system of an animal;
obtaining a treatment effect to said meat of said animal.

6 A process according to claim 1, wherein said animal is frozen whole.

7 A process according to claim 1, wherein said meat is frozen.

5 8. A process according to claim 1, further comprising:

said gas contains carbon monoxide;

said carbon monoxide diffuses into the blood of said animal and binds
with hemoglobin forming COHb.

said blood containing COHb flows through the circulatory system into
said meat and COMb is formed;

10 9. A process according to claim 1, further comprising:
said gas kills or sedates said animal for harvesting.

10. A process according to claim 1, wherein said animal is seafood.

11. A process according to claim 1, wherein said animal is fish.

15 12. A process according to claim 1, wherein said animal is beef, pork, or fowl.

13. A process according to claim 11, wherein said fish is salmon, tuna, or
tilapia.

14. A process according to claim 1, further comprising:
said animal has gills;

said animal ventilates water through said gills.

15. A process according to claim 1, further comprising:
said animal has lungs;

said animal ventilates said gas through said lungs;

said respiration occurs through said lungs.

25 16. A process according to claim 14 further comprising:
said gas is entrained into foam colloid;
said foam colloid is applied to said gills.

17. A process according to claim 1, wherein said preservation is applied by
mass-treatment of groups of said animals.

18. A process according to claim 1, further comprising: said gas is derived from raw smoke; water and animal membranes act to super-purify said smoke preventing smoke flavor from being imparted to said meat.
19. A process according to claim 1, wherein treatment occurs after said animal is dead.
20. A process according to claim 1, further comprising:
said gas is pumped through said circulatory system by a heart;
bleeding said animal begins before said heart stops pumping.
21. A process according to claim 1, further comprising:
said gas is contained in capsules;
said gas capsules are introduced into said circulatory system through the digestive track.
22. A process according to claim 1, further comprising:
an artificial means of respiration replacing said respiratory system.
23. A process according to claim 22, further comprising:
an artificial pump replacing said heart.
24. A process according to claim 14, further comprising:
said gas is entrained in water;
a portion of said entrained gas is dissolved in said water;
said water inspires during said ventilating.
25. A process according to claim 14, further comprising:
a gas solute;
a liquid solvent;
said gas solute and said liquid solvent are in contact at a pressure above one atmosphere;
said gas solute dissolves in said liquid solvent forming a solution;
said solution is applied to said gills.
26. A process according to claim 15, further comprising:
a respirator;
said treatment gas is supplied by said respirator to said lungs;
said gas is diffused into the blood during said ventilating.

27. A process according to claim 11, further comprising:
foam containing said gas;
removing said fish from water and applying said foam to the gills of said fish.

5 28. A process according to claim 14, further comprising:
said animal inspires water containing concentrations greater than 80 nl of
carbon monoxide per liter of said inspired water.

10 29. A process according to claim 8, further comprising:
blood of said animal contains COHb concentration ranging between
approximately 5% and 100%.

15 30. A process according to claim 14, further comprising:
said animal inspires water containing carbon monoxide for a duration
ranging from approximately a few seconds to several hours.

20 31. A process according to claim 14, further comprising:
said animal inspires water containing carbon monoxide for a duration
ranging from approximately 1.5 minutes to 1 hour.

25 32. A process according to claim 28, further comprising:
said animal containing blood;
said carbon monoxide diffuses from said inspired water into said blood
and COHb concentration increases;
subsequently, said animal inspires water with less than 80 nl of carbon
monoxide per liter;
said carbon monoxide diffuses from said blood into said inspired water
with less than 80 nl of carbon monoxide and said COHb concentration
decreases.

30 33. A process according to claim 14, further comprising:
liquid;
carbon monoxide gas combined with liquid making a foam colloid
solution;
said foam colloid solution is applied to said gills.

35 34. A process according to claim 33, further comprising:

ratio of said gas to said liquid ranges from between approximately 1:1 to 10:1;

said animal is living in biologically suitable water:

said animal is removed from said biologically suitable water before said foam colloid solution is applied to said gills;

said respiratory and circulatory activity lingers for a treatment duration ranging from approximately 3 minutes to 20 minutes after said animal is removed from said biologically suitable water .

35. A process according to claim 34, wherein said foam colloid solution is exposed to said gills for a duration ranging from approximately 10 seconds to 30 minutes.

36. A process according to claim 11, further comprising:
said gas contains carbon monoxide:
said treated fish meat is fish having carbon monoxide concentrations ranging from between approximately 1.1 to 20 times the quantity of carbon monoxide in untreated fish meat.

37. A process according to claim 11, further comprising:
said gas includes carbon monoxide;
said treated fish meat having carbon monoxide concentrations ranging from between approximately 1.1 to 80 times the quantity of carbon monoxide in untreated fish meat.

38. A process according to claim 8, further comprising:
intensity of said meat treatment controlled by varying the COHb.

39. A process according to claim 14, further comprising:
carbon monoxide dissolved in respirable water;
said animal ventilates said respirable water producing COHb;
intensity of treatment and carbon monoxide content in said meat is regulated by varying said carbon monoxide concentration in said respirable water, and;
varying said ventilation time.

40. A process according to claim 8, further comprising:

said animal is a fish;
said gas is dissolved in a liquid solution and inspired by said fish;
said inspired solution contains sufficiently high concentrations of carbon
monoxide to cause approximately 100% COHb production for the total
volume of blood passing through the gills during ventilation;
time of said ventilation multiplied by cardiac output determines total
milliliters COHb per kilogram of body weight;
said total milliliters COHb per kilogram of body weight produced divided
by total Hb per kilogram of body weight, equals average COHb saturation;
maximum saturation is 100% COHb.

41. A process according to claim 8, further comprising:
said animal is fish;
carbon monoxide concentration in said treated meat range from between
approximately 1.1 to 3.99 times carbon monoxide concentration in
untreated meat.
42. A process according to claim 8, further comprising:
said animal is fish;
carbon monoxide concentration in said treated meat range from between
approximately 4 to 9.99 times carbon monoxide concentration in untreated
meat.
43. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of said tuna meat ranges from between
approximately 22 $\mu\text{g/kg}$ to 957 $\mu\text{g/kg}$.
44. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tuna range from
between approximately 44 $\mu\text{g/kg}$ to 399 $\mu\text{g/kg}$.
45. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tuna range from

between approximately 80 µg/kg to 2,397 µg/kg.

46. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tuna range from
between approximately 160 µg/kg to 999 µg/kg.
47. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tuna range from
between approximately 200 µg/kg to 4,800 µg/kg.
48. A process according to claim 1, further comprising:
said animal is a tuna ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tuna range from
between approximately 400 µg/kg to 2,000 µg/kg.
49. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from
between approximately 6.6 µg/kg to 60 µg/kg.
50. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from
between approximately 7.7 µg/kg to 40 µg/kg.
51. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from
between approximately 24 µg/kg to 150 µg/kg.
52. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from
between approximately 28 µg/kg to 99.9 µg/kg.
53. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;

carbon monoxide concentration of the flesh of said tilapia range from between approximately 60 μ /kg to 300 μ g/kg.

54. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from between approximately 70 μ g/kg to 200 μ /kg.

55. A process according to claim 1, further comprising:
said animal is a tilapia ventilating a fluid containing carbon monoxide;
carbon monoxide concentration of the flesh of said tilapia range from between approximately 300 μ g/kg to 1,200 μ g /kg.

56. A process according to claim 14, further comprising:
said gas is dissolved in said water;
volume of said dissolved gas is expressed by a formula;
said formula is: $v_o = \text{absorption coefficient} \times (V \times P_o)$.

57. A process according to claim 14, further comprising:
said animal ventilates water;
said gas is dissolved in said water;
coefficient of solubility formula defined as:
“ $V_o = (v \times P_g \times T_o)/T$ ”.

58. A process according to claim 14, further comprising:
said gas is carbon monoxide dissolved in said water;
gill absorption of said dissolved carbon monoxide is defined in a formula;
said formula is: $\text{CO gill absorption} = (\text{cardiac output} \times (\text{Hb} \times 1.39 \times \% \text{sat}) \times \text{wt}) + ((\text{cardiac output} \times (0.029 \times \text{PCO}) / 100) \times \text{wt})$

59. A process according to claim 14, further comprising:
said gas is carbon monoxide dissolved in said water;
said carbon monoxide gill absorption/kg = 18.35 mlCO/min/kg.

60. A process according to claim 14, further comprising:
said animal is a tuna;
said gas is carbon monoxide dissolved in said water;
said tuna tissue ranges from approximately 22 to 957 μ g CO/kg;

said tuna tissue ranges from approximately 018 to .766 mlCO/kg;
said tuna blood ranges from approximately 2.07 to 4.94 mlCO/kg.

61. A process according to claim 14, further comprising:

said animal is a tuna;

said gas is carbon monoxide dissolved in said water;

said tuna tissue ranges from approximately 44 to 399 $\mu\text{g CO/kg}$;

said tuna tissue ranges from approximately .035 to .319 mlCO/kg;

said tuna blood ranges from approximately 2.07 to 3.99 mlCO/kg.

62. A process according to claim 14, further comprising:

said animal is a tuna;

said gas is carbon monoxide dissolved in said water;

said tuna tissue ranges from approximately 80 to 2,397 $\mu\text{g CO/kg}$;

said tuna tissue ranges from approximately .064 to 1.919 mlCO/kg;

said tuna blood ranges from approximately 7.34 to 12.36 mlCO/kg.

63. A process according to claim 14, further comprising:

said animal is a tuna;

said gas is carbon monoxide dissolved in said water;

said tuna tissue ranges from approximately 160 to 399 $\mu\text{g CO/kg}$;

said tuna tissue ranges from approximately .128 to .800 mlCO/kg;

said tuna blood ranges from approximately 7.34 to 9.97 mlCO/kg.

64. A process according to claim 14, further comprising:

said animal is a tuna;

said gas is carbon monoxide dissolved in said water;

said tuna tissue ranges from approximately 200 to 4,800 $\mu\text{g CO/kg}$;

said tuna tissue ranges from approximately .160 to 3.840 mlCO/kg;

said tuna blood ranges from approximately 18.34 to 24.72 mlCO/kg.

65. A process according to claim 14, further comprising:

said animal is a tuna;

said gas is carbon monoxide dissolved in said water;

said tuna tissue ranges from approximately 400 to 2,000 $\mu\text{g CO/kg}$;

said tuna tissue ranges from approximately .320 to 1.601 mlCO/kg;

said tuna blood ranges from approximately 18.34 to 19.94 mlCO/kg.

66. A process according to claim 14, further comprising:

said animal is a tilapia;

said gas is carbon monoxide dissolved in said water;

said tilapia tissue ranges from approximately 6.6 to 60 $\mu\text{g CO/kg}$;

said tilapia tissue ranges from approximately .005 to .048 mlCO/kg;

said tilapia blood ranges from approximately .18 to .86 mlCO/kg.

67. A process according to claim 14, further comprising:

said animal is a tilapia;

said gas is carbon monoxide dissolved in said water;

said tilapia tissue ranges from approximately 7.7 to 40 $\mu\text{g CO/kg}$;

said tilapia tissue ranges from approximately .006 to .032 mlCO/kg;

said tilapia blood ranges from approximately .18 to .53 mlCO/kg.

68. A process according to claim 14, further comprising:

said animal is a tilapia;

said gas is carbon monoxide dissolved in said water;

said tilapia tissue ranges from approximately 2.4 to 150 $\mu\text{g CO/kg}$;

said tilapia tissue ranges from approximately .019 to .120 mlCO/kg;

said tilapia blood ranges from approximately .44 to 2.10 mlCO/kg.

69. A process according to claim 14, further comprising:

said animal is a tilapia;

said gas is carbon monoxide dissolved in said water;

said tilapia tissue ranges from approximately 2.8 to 100 $\mu\text{g CO/kg}$;

said tilapia tissue ranges from approximately .022 to .080 mlCO/kg;

said tilapia blood ranges from approximately .44 to 1.31 mlCO/kg.

70. A process according to claim 14, further comprising:

said animal is a tilapia;

said gas is carbon monoxide dissolved in said water;

said tilapia tissue ranges from approximately 60 to 1,200 $\mu\text{g CO/kg}$;

said tilapia tissue ranges from approximately .048 to .961 mlCO/kg;

said tilapia blood ranges from approximately 3.20 to 15.11 mlCO/kg.

71. A process according to claim 14, further comprising:
said animal is a tilapia;
said gas is carbon monoxide dissolved in said water;
said tilapia tissue ranges from approximately 70 to 200 $\mu\text{g CO/kg}$;
said tilapia tissue ranges from approximately .056 to .160 mlCO/kg ;
said tilapia blood ranges from approximately 3.20 to 9.41 mlCO/kg .
72. A process according to claim 8, further comprising:
said animal is a tuna;
the ratio of COHb to COMb in said tuna ranges from approximately 5:1 to 153:1.
73. A process according to claim 8, further comprising:
said animal is a yellowfin fish;
the ratio of COHb to COMb in said yellowfin tuna ranges from approximately 11:1 to 68:1.
74. A process according to claim 8, further comprising:
said animal is a tilapia;
the ratio of COHb to COMb in said tilapia ranges from approximately 11:1 to 67:1.
75. A process according to claim 8, further comprising:
said animal is a tuna;
the ratio of COHb to COMb in said tuna averages approximately 9.9:1.
76. A process according to claim 8, further comprising:
said animal is a yellowfin fish;
the ratio of COHb to COMb in said yellowfin tuna averages approximately 18.7:1.
77. A process according to claim 8, further comprising:
said animal is a tilapia;
the ratio of COHb to COMb in said tilapia averages approximately 9.9:1.
78. A process according to claim 14, further comprising:
minimum treatment time is 8 seconds.
79. A process according to claim 14, further comprising:

minimum treatment time is 14 seconds.

80. A process according to claim 14, further comprising:

$$\text{CO gill absorption} = (115 * (.11 * 1.39 * 100\%) * 1) + ((115 * (.0029 * 228) / 100) * 1)$$

$$= 17.58 + 0.76 \text{ mlCO/min} = 18.34 \text{ mlCO/min.}$$

81. A process according to claim 11, further comprising:

$$\text{CO gill absorption/kg} = 18.34 \text{ mlCO/min/kg.}$$

82. A process according to claim 1, further comprising:

said treated meat replicates natural coloration and subsequent discoloration of untreated meat.

83. A process according to claim 14, further comprising:

COHb concentration in said animals' blood is controlled by regulating carbon monoxide concentrations in said water and rate of said ventilation.

84. A process according to claim 14, further comprising:

said animal is tuna;

said ventilated water contains no less than .092 mlCO/liter H₂O.

85. A process according to claim 14, further comprising:

said animal is tuna;

said ventilated water contains no less than .882 mlCO/liter H₂O.

86. A process according to claim 14 further comprising:

said animal is tuna;

said ventilated water contains no less than 2.646 mlCO/liter H₂O.

87. A process according to claim 14 further comprising:

said animal is tilapia;

said ventilated water contains no less than .008 mlCO/liter H₂O.

88. A process according to claim 14 further comprising:

said animal is tilapia;

said ventilated water contains no less than .176 mlCO/liter H₂O.

89. A process according to claim 14 further comprising:

said animal is tilapia;

said ventilated water contains no less than 1.408 mlCO/liter H₂O.

- 5
90. An apparatus for a solution used to treat meat comprising;
solvent;
gas solute;
a means to dissolve said gas into said solvent;
said gas solute is dissolved in said solvent forming said treatment solution.
- 10
91. An apparatus comprising:
a treatment tank;
water contained in said treatment tank;
fish contained in said water;
carbon monoxide gas dissolved in said water;
fish respire said water containing dissolved carbon monoxide;
said carbon monoxide causes a treatment affect to the meat of said fish.
- 15
92. An apparatus for treating meat comprising;
a container;
said container containing a colloid solution;
carbon monoxide gas entrained in said colloid solution;
said carbon monoxide colloid solution applied to seafood;
the meat of said seafood obtaining a treatment effect.